



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO.  | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.             | CONFIRMATION NO.            |
|--|-------------|----------------------|---------------------------------|-----------------------------|
| 10/535,358   | 01/11/2006  | Andrew R Barron      | 1789-09405                      | 3910                        |
| 23505  | 7590        | 02/10/2009           |                                 |                             |
| CONLEY ROSE, P.C.<br>David A. Rose<br>P. O. BOX 3267<br>HOUSTON, TX 77253-3267 |             |                      | EXAMINER<br>DANG, TRUNG Q       |                             |
|  |             |                      | ART UNIT<br>2892                | PAPER NUMBER                |
|  |             |                      | NOTIFICATION DATE<br>02/10/2009 | DELIVERY MODE<br>ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

pathou@conleyrose.com

|                              |                                      |                                      |  |
|------------------------------|--------------------------------------|--------------------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b><br>10/535,358 | <b>Applicant(s)</b><br>BARRON ET AL. |  |
|                              | <b>Examiner</b><br>Trung Dang        | <b>Art Unit</b><br>2892              |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-8 and 16-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 16-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 7-8, 16-23, and 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goda et al. (US 5,132,140) in view of Faur et al. (US 6,613,697), all of record.

The rejection is maintained as of record and repeated herein.

With reference to Fig. 3, Goda teaches a method for depositing an inorganic material (silicon dioxide) from a reactive solution onto a silicon substrate, comprising: immersing said silicon substrate into the reactive solution of  $\text{H}_2\text{SiF}_6$ ; and regenerating said reactive solution through pump 8 and filter 7 to allow for continuous growth of said inorganic material onto said substrate (col. 5, lines 30-55, and EXAMPLE 4 for a substrate being a silicon wafer).

Goda differs from the claims in not disclosing the step of chemically treating said substrate to activate growth of said inorganic material as claimed.

Faur teaches a widely used RCA cleaning of a silicon wafer performed prior to a liquid phase deposition (LPD) of silicon dioxide on the surface of the silicon substrate, comprising: a standard SC1 step using  $\text{NH}_4\text{OH}:\text{H}_2\text{O}_2:\text{H}_2\text{O}$  (1:1:5) volume parts solution

Art Unit: 2892

and a standard SC2 step using HCl:H<sub>2</sub>O<sub>2</sub>:H<sub>2</sub>O (1:1:6) volume parts solution (col. 8, lines 5-22).

It would have been obvious to one of ordinary skill in the art to modify Goda's teaching by performing the cleaning process as suggested by Faur so as to remove contaminants from the surface of the substrate which would hinder the growth of silicon dioxide.

For claim 8, Fig. 3 shows the recirculating solution passes through filter 7 that has silica particles larger than 1.5 microns filtered inside (col. 7, lines 57-59). Thus, the recirculating solution is saturated again (i.e., regenerated) by the addition of the silica dissolved in the solution.

For claims 17, 19 and 20, although the component ratios of the cleaning solutions and the treating temperature and duration taught by Faur are different from that of recited in the claims, such determination of process parameters would have been obvious to one skilled in the art because it is well settled that, absent a showing of criticality or unexpected result by applicant, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 10 USPQ2d (Fed.cir), cert. denied, 493 U.S. 975 (1989); *In re Kulling*, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997). Furthermore, the specification contains no disclosure of either the critical nature of the claimed process

Art Unit: 2892

parameters or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen variables recited in the claims, the applicant must show that the chosen variables are critical. *In re Woodruff*, 919 F.2d, 1575, 1578, 16 USPQ2d, 1936 (Fed. Cir. 1990).

For claims 21-23, the HF contains in the recirculation solution when reacts with silicon dioxide particles in filter 7 inherently reduces HF and generates  $\text{H}_2\text{SiF}_6$  according to the chemical reaction (1) recited at col. 5 in Goda.

3. Claims 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goda taken with Faur as applied to claims 1-3, 7-8, 16-23, and 26-27 above, and further in view of Zhao et al. (US 2003/0118064 of record).

The rejection is maintained as of record and repeated herein.

The combination of Goda and Faur teaches a method for depositing an inorganic material from a reactive solution onto a substrate as described above.

The combined process differs from the claims in not disclosing that the LPD of silicon dioxide on a silicon substrate can be applied for the fabrication of a semiconductor nano-chip wherein the silicon dioxide forms an optical waveguide.

Zhao teaches an optical waveguide comprises a nano-ultrafine crystalline Si thin 110 film and silicon dioxide films 104/108 deposited on a Si substrate 102 (Fig. 3).

Thus, employing the LPD process taught by Goda and Faur for the fabrication of the optical waveguide device taught by Zhao would have been obvious to one of

Art Unit: 2892

ordinary skill in the art because the application of a known process to make a known device would have been within the level of one skilled in the art.

4. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goda taken with Faur as applied to claims 1-3, 7-8, 16-23, and 26-27 above, and further in view of Liang et al. (US 2002/0173170 of record).

The rejection is maintained as of record and repeated herein.

The combination of Goda and Faur teaches a method for depositing an inorganic material from a reactive solution onto a substrate as described above.

The combined process differs from the claims in not disclosing a monitoring system for monitor the depletion of silica in the reactive solution.

Liang teaches an apparatus used for LPD of silicon dioxide, which employs an automatic solution concentration monitoring system 109 (Fig. 3) for controlling the reactant concentration (para. [0030]).

It would have been obvious to one of ordinary skill in the art to modify the combined process of Goda and Faur by incorporating the automatic solution concentration monitoring system 109 for controlling the reactant concentration as suggested by Liang for the purpose of controlling the reaction conditions because it is known the deposition rate and the quality of the deposited film depend on the concentration of  $\text{H}_2\text{SiF}_6$  in the reactive solution. Furthermore, it is also known the concentration of  $\text{H}_2\text{SiF}_6$  in the solution in turn depends on the amount of silica added according to the chemical reaction (1) noted above. Thus, incorporating the monitor

Art Unit: 2892

system 109 would continuously monitor the quantity of silica in the reactive solution and therefore allowing an operator to detect the depletion of silica and adding silica accordingly upon depletion so as to control the film forming process.

### ***Response to Arguments***

5. Applicant's arguments filed 11/21/08 have been fully considered but they are not persuasive.

In page 6 of the Remarks, applicants contend Goda does not disclose a method that allows for "continuous growth" of the inorganic material onto the substrate because "the solutions of *Goda* are removed from the treating system, cooled and saturated with silicon dioxide before being returned to the treating system. Growth of the inorganic material would occur upon return of the regenerated solution to the treating system and therefore, the growth is not continuous as claimed by Applicants. Applicants refer a passage in the prior art to support for the argument. Specifically, applicants add emphasis in column 5, lines 52-55, where Goda discloses "In the present invention, at least a part of the treating solution may be continuously taken out of the treating system and circulated, while cooling and saturating it again by addition of silicon dioxide."

The Examiner respectfully disagrees. As pointed out by applicants, Goda teaches only **a part**, but not all of the treating solution is continuously taken out the system and circulated. As such, silicon dioxide is still deposited on the substrate at the moment a part of the treating solution is taken out because the remaining solution is not depleted with hydrosilicofluoric acid which is the main ingredient for the deposition of

Art Unit: 2892

silica to occur. At most, at that instant, the deposition rate is changed but not ceased. Fig. 4 clearly shows the deposition is a continuous process in a time frame of 10 hours because there is no discontinuity in the curves representing the deposition rate. For the purpose of argument, the present invention also discloses a part of the treating solution is taken out of the tank and circulated (see Fig. 1), yet the growth is not interrupted as alleged in the prior art. Applicants' argument is therefore unsubstantial.

### ***Conclusion***

**6. THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of the policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

**7.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Trung Dang whose telephone number is 571-272-1857. The examiner can normally be reached on Mon-Friday 9:30am-6:00pm.



Art Unit: 2892

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao Le can be reached on 571-272-1708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Trung Dang/  
Primary Examiner, Art Unit 2892

2/3/09